

I claim:

1. an aircraft capable of both conventional and VTOL flight, called a jyrodyne, comprising:

a set of canard wings mounted at or below the fuselage at the front of the jyrodyne;

two sets of wings, mounted in a biplane fashion, the bottom wing mounted so that the wing center of lift is located slightly ahead of the jyrodyne center of gravity, the top wing is mounted so that its center of lift is located slightly behind the jyrodyne center of gravity; the combined center of lift from the two wings occurring at the jyrodyne center of lift;

bicycle-type landing gear comprised of a main nosewheel and main tail wheel mounted along the longitudinal axis of the jyrodyne fuselage with two outrigger landing gear mounted on extensions in front of the bottom the wings:

said top wing containing a large circular opening in its center for mounting an exbedded ducted fan, shroud and rotor, exbedded meaning the duct diameter extends beyond the outer edge of the jyrodyne fuselage at the center of the top wing;

a central tailfin mounted above and behind the ducted fan bellmouth, supporting the horizontal stabilizer and mounting a rudder; said tailfin mounted on top of the rear third of the fuselage;

said biplane wings connected to each other at the longitudinal tangent line of the ducted fan shroud outlet opening in the top and bottom wings by airfoil-shaped, near-vertical wing support panel structures called midriggers;

said bottom wing containing a slightly larger central opening for the exhaust airstream from the ducted fan; said central opening extending rearward;

said biplane wings connected together at the wingtips by near vertical, airfoil-shaped planar support structures called sidefins;

said sidefins extending to further connect to the wingtips of the horizontal stabilizer of the jyrodyne, mounted to the rear and above the top wing, as such called a "T" tail to those skilled in the art;

said central tailfin and two sidefins comprising a total tail surface area equivalent to 40% of the biplane wing surface area in the preferred embodiment, with a range in total tail surface area for the tailfin and two sidefins from 25% to 60% of the biplane wing surface area;

three movable rudder surfaces, mounted in the tailfin and two sidefins; the total area of the three rudder surfaces to be 40% of the total fin(vertical stabilizer) area in the preferred embodiment, the total fin area to be considered that of the tailfin and the two sidefins; the area of the three rudder surfaces to range between 25% and 60% of said total fin area;

said "T" tail, with its tips extending out to the full span distance of the main biplane wings and connected to an extension of the sidefins attached to the ends of the two biplane wings; said "T" tail comprised of a horizontal stabilizer whose surface area in the preferred embodiment is equal to 37% of the surface area of the two biplane wings, and which falls in a range of from 25-60% of the surface area of the two biplane wings.

2. The jyrodyne of claim 1, with a single exbedded ducted fan, comprising a shrouded duct with a bellmouth inlet, said shrouded duct containing a rotor, said shrouded duct and rotor mounted in the large circular opening in the jyrodyne top wing with the propulsion shaft for the rotor oriented vertically, said shaft projecting downward into the center of the jyrodyne fuselage; said shaft located at the jyrodyne center of lift of the biplane wings; and coincidentally at the jyrodyne center of gravity, to provide vertical lift propulsion;

an exbedded ducted fan whose inlet shroud inside diameter extends beyond the diameter of the fuselage; defining an exbedded ducted fan;

a bellmouth shaped inlet to the ducted fan shroud with a bellmouth radius of from 0.1 to 0.3 times the ducted fan diameter;

a ducted fan shroud that acts as a direct structural support for the top wing, and indirectly for the bottom wing.

3. The jyrodyne with a single exbedded ducted fan of claim 2, further comprising aerodynamic controls to provide control over pitch, yaw and roll while in vertical take off and landing(VTOL) mode as defined as;

center of gravity adjustment pitch deflectors to provide for adjustments to the center of VTOL lift;

exbedded airpath roll/yaw control vanes to provide jyrodyne control of yaw and roll while in the VTOL mode of flight; said vanes mounted outside the jyrodyne fuselage while inside the diameter of the ducted fan;

imbedded and canted pitch control vanes to provide jyrodyne control of pitch while in the VTOL mode of flight;

three to four mid-section anti-torque airfoils, providing horizontal thrust to create a torque effect opposite to that produced by the jyrodyne engines and ducted fan rotor.

4. The jyrodyne with a single exbedded ducted fan of claim 2, with horizontal propulsive means to provide forward motion defined as a tractor propeller mounted over the rear section of the bellmouth- shaped entrance

of the ducted fan; to assist the aerodynamic controls in compensation to the pitch up experienced in ducted fan aircraft in the transition from VTOL to conventional flight.

5. The jyrodyne with a single exbedded ducted fan of claim 2, with horizontal propulsive means to provide forward motion defined as a pusher propeller mounted over the rear section of bellmouth-shaped entrance of the ducted fan; to assist the aerodynamic controls in compensation to the pitch up experienced in ducted fan aircraft in the transition from VTOL to conventional flight.
6. The jyrodyne with a single exbedded ducted fan of claim 2, with horizontal propulsive means to provide forward motion defined as a turbofan jet engine mounted over the rear section of bellmouth-shaped entrance of the ducted fan; to assist the aerodynamic controls in compensation to the pitch up experienced in ducted fan aircraft in the transition from VTOL to conventional flight.
7. The jyrodyne with a single exbedded ducted fan of claim 2, with horizontal propulsive means to provide forward motion defined as a turboprop jet engine mounted over the rear section of bellmouth-shaped entrance of the ducted fan.
8. The jyrodyne of claim 2, with aerodynamic controls for the transitional flight regime comprising:

a three control surface elevator, which covers the full wingspan of the jyrodyne, where the central third of the elevator is in the slipstream of the tractor propeller to be used to enhance jyrodyne stability in pitch during engine throttle adjustments in the conventional flight regime, the two outer third sections acting as conventional elevator surfaces; said elevator area to comprise 35% of the area of the horizontal stabilizer in the preferred embodiment, and in the range of 25-50% of the area of the horizontal stabilizer to provide satisfactory aerodynamic control of pitch;

flaps on the bottom wing of the biplane set of wings;

ailerons on the top wing of the biplane set of wings; said bottom wing to have no lifting surfaces on its rear part inside the midriggers.

9. The jyrodyne of claim 8, whose elevator adjusts its position when the engine throttle position is changed, to compensate for the downward force on the nosegear of the jyrodyne impressed by the thrust from the forward propulsion system.

10. The jyrodyne of claim 1, further comprising sidefins whose front and rear edges extend linearly to the front and rear edges of the bottom wing wingtips, respectively, and then to the front and rear edges of the top wing wingtips, and then to the front and rear of the wingtips of the T-tail; the sidefin top curvature between the top wing and T-tail curved concavely in an "S" shaped curve, to reduce the amount of sidefin area exposed to crosswinds pressing against the sidefin above the jyrodyne lateral center of gravity; dorsal extensions of the sidefins extending below the bottom wing, to add surface area to the sidefins below the jyrodyne lateral center of gravity; the purpose of the "S" shaped curve and dorsal extensions to lower the center of pressure of the sidefins to below the center of gravity of the jyrodyne.
11. The jyrodyne of claim 1, said midrigger located at the longitudinal tangent lines of the central ducted fan shroud, parallel to the fuselage and airflow, to connect the top and bottom wings for structural reasons and enhanced vertical thrust, on both sides of the jyrodyne; said midriggers canted so that the bottom of the midriggers is located further outboard than the top of said midriggers; the angle between a vertical line and the midriggers to be between 3 and 10 degrees, with 7 degrees the optimal value in the preferred embodiment.
12. The jyrodyne of claim 11, with said midrigger dorsal fins extending below the bottom wing to enhance vertical thrust recapture.
13. The jyrodyne of claim 2, powered by either a single or two engines, driving both the exbedded ducted fan and the horizontal propulsive means using two clutches to transfer power incrementally between the ducted fan rotor and the horizontal propulsive means; said clutches mounted with said engines to transmit power through a driveshaft, said driveshaft mounted on a drivetrain truss.
14. The jyrodyne of claim 2, whereby the transfer of engine power is made using two clutches: one clutch, called the VTOL clutch, to control activation of engine power to the exbedded ducted fan rotor, and the other clutch, called the conventional flight clutch, to control the activation of engine power to the tractor propeller.
15. The drivetrain of claim 9, whose clutches are controlled by a single floor mounted foot pedal and trimmed using two instrument, floor, sidewall or ceiling mounted trim levers for controlling the relative rate of mix of clutch engagement/disengagement between the two clutches.
16. The jyrodyne of claim 1, with a landing gear comprising a single main nosegear, with outrigger wheels mounted in front of the junction of said midrigger with the bottom wing on both sides of the jyrodyne; to prevent jyrodyne roll-over during takeoff rolls while at high engine power settings, with a conventional tailwheel arrangement mounted at the rear end of the drivetrain truss.

17. The jyrodyne of claim 2, with a single top wing instead of the biplane wing arrangement, with the exbedded airpath roll/yaw control vanes mounted on stalks projecting downward from the ducted fan shroud.
18. The jyrodyne of claim 2, with collapsing passenger seats which have a two-stage collapsing mechanism, where the rear of the seat fails backward at a G loading of 5 to 10 G's, said collapsing mechanism comprising a Euler column which collapses at 5 G's, an aluminum honeycomb block under the seat collapsing at 5-10 G's, a double sliding armrest support tube collapsing at 10 G's allowing the seat to recline, and once reclined, continues to fail through the collapse of another higher density aluminum honeycomb at controlled rate of 30 G's deceleration.
19. The jyrodyne of claim 1, where the canard wings may act as a fuel tank, and where the fuel in that tank can be transferred to the main wing fuel tanks in the biplane wings.
20. The jyrodyne propulsion system of claim 9, where an incremental change in the position of the pitch and roll/yaw control vanes results in a change in the throttle position to compensate for the increased drag and redirected thrust vector of the vanes; the mixture rate claimed is from 3 to 15%, whereby a fullscale deflection of the vane control surface will cause an increase in the throttle setting of from 3 to 15%.